Modeling 4D Benefits: Project Update August 16, 2007

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Study Purpose Recap

- Quantify effects of Blueprint Land Use concepts on travel and air quality
- Regional (4-step) model lacks sensitivity to important land use characteristics:
  - Higher Density
  - Mixing of Uses (Diversity)
  - Transit and Pedestrian-Oriented Design
  - Role of Regional Transit Accessibility in reducing auto ownership and use
- Attempt to adapt “4Ds” methodology from Baltimore (2005) to SCAG model

Post-Processor Approach

4. Insufficient time/resources to attempt internal changes to SCAG model
5. Recreate Baltimore Auto Ownership and Household VMT models with SCAG data
6. Apply models to calculate VMT differences attributable to Blueprint land use designs in individual TAZs
7. Develop TAZ adjustment factors based on difference vs. SCAG model estimate

Evaluation Scenarios

2035 Scenarios	Jobs & Households Distribution	Transportation Network	Land Use
Baseline	General Plan	No-Build	General Plan
Plan	General Plan	Plan	General Plan
Blueprint Test	Blueprint Test	Plan	Blueprint Test
Blueprint Envision	Blueprint Envision	Plan	Blueprint Envision

Progress Since Last Update

- Refined & reached agreement on regression models
- Advanced methodology for application to scenarios
- Finishing coding of land use designations for baseline scenarios (Fregonese Associates)

Final Regression Models

Auto Ownership:

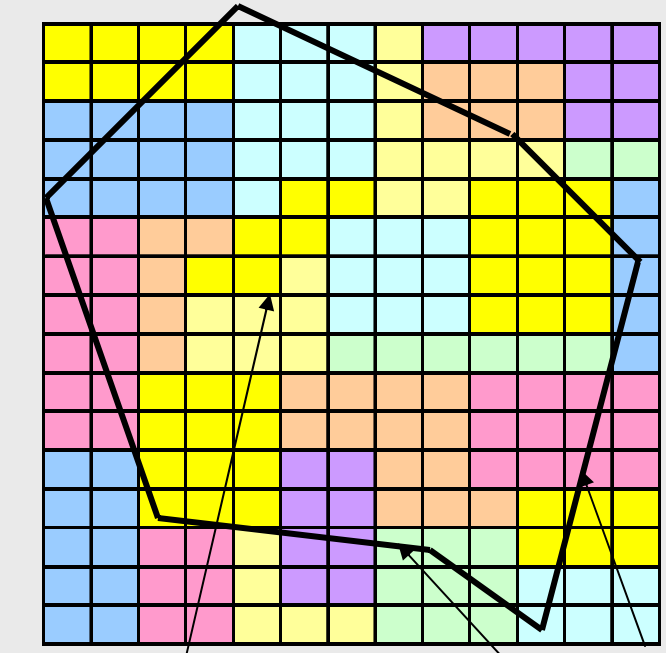
HH Autos = 0.812 + 0.235 HH Size + 0.166 Income - 0.1 E-06 Regional Transit Acc - 0.154 LU Mix - 0.0334 LN Walk Opportunities $r^2 = 0.261$

Daily Household VMT:

LN HH VMT = 1.596 + 0.0415 HH Size + 0.061 Income + 0.315 Workers + 0.1032 Autos - 0.1 E-06 Regional Transit Acc - 0.0278 LN Walk Opportunities + 0.532 LN HBW VMT $r^2 = 0.507$

Application to Forecasting

Depiction of Land Use in Future Scenarios

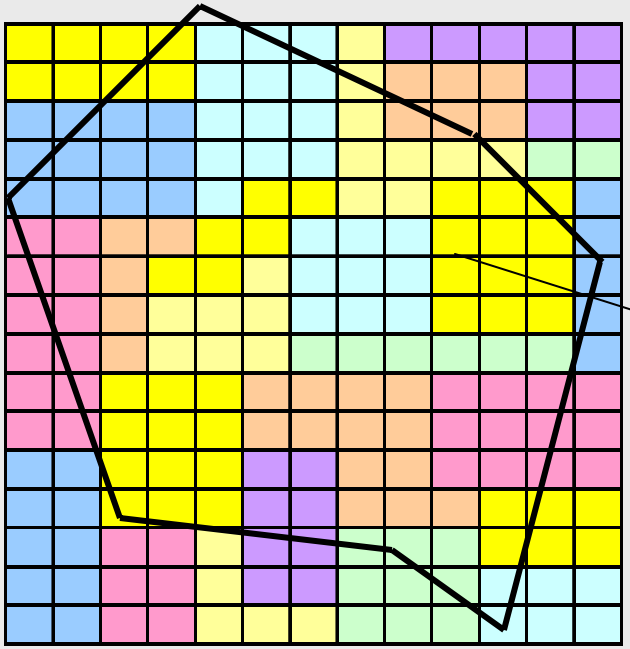


Compass 2% Land Use Categories (17)

- Town Center
- Town Residential
- City Neighborhood
- Large Lot
- Transit Station
- Residential Subdivision
- Highway Commercial

Application to Forecasting

Determining Influence of Land Use in TAZ



Look-Up Table

LU Mix (by type)

Walk Opportunities (by type)

Land use type *j*

Quantity (# HHs)

$$\text{Avg LU Mix}_{TAZ} = \frac{\Sigma_j (\text{HHs}_j * \text{LU Mix}_j)}{\text{Total HHs}}$$

Look-Up Table Default Values

Dev type	Resid	Empl	Ret/Svc	LU Mix	WtdOpp	HH VMT	% Red
Downtown Ctr	8%	75%	17%	0.655	5000	43.79	-10.9%
Downtown Res	57%	0%	43%	0.622	10000	42.97	-12.5%
City Center	38%	24%	38%	0.981	8000	43.00	-12.5%
City Res	72%	5%	23%	0.659	6000	43.56	-11.3%
Town Center	60%	20%	20%	0.865	6000	43.42	-11.6%
Town Res	95%	0%	5%	0.181	500	47.09	-4.2%
City Neighborhood	95%	0%	5%	0.181	500	47.09	-4.2%
Residential Sub	100%	0%	0%	0.000	0	54.94	11.8%
Large Lot	100%	0%	0%	0.000	0	54.94	11.8%
Rural Cluster	100%	0%	0%	0.000	0	54.94	11.8%
Activity Center	35%	50%	15%	0.909	5000	43.62	-11.2%
Transit Station	80%	4%	16%	0.547	5000	43.87	-10.7%
Transit Corridor	87%	0%	13%	0.352	2000	45.16	-8.1%
Main Street	60%	0%	40%	0.613	8000	43.24	-12.0%
Office Park	0%	100%	0%	0.000	0	54.94	11.8%
Industrial	0%	100%	0%	0.000	0	54.94	11.8%
Highway Commercial	45%	0%	55%	0.048	500	47.19	-3.9%

	Min	Max	Mean
Wtd Opps	0	10524	121
LU Mix	0	0.821	0.269
HH VMT			49.13

Calculating VMT for TAZ

VMT_{TAZ} = *f* (Sociodemographics, Auto Ownership, Transit Accessibility, Local Land Use)

- **Sociodemographic Inputs**: HH Size, Income, Workers
  From cross-classification matrix for TAZ (4 x 4 x 4)
- **Auto Ownership**
  Calculated by regression equation
- **Regional Transit Accessibility**
  Calculated at TAZ to TAZ level
- **Local Land Use:** LU Mix, Walk Opportunities
  From grid cell designation, weighted by households

Next Steps

- Demonstrate and obtain SCAG approval for application methodology
- Test application on LA County
  - 2035 Baseline
  - Blueprint Envision
- Tweak & finalize approach
- Apply to all counties and each scenario